



Android-based e-module in improving student learning outcomes on virus material in high school



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ABSTRACT

The increasingly rapid development of technology causes students to be more interested in using digital-based teaching media, one of which is Android-based E-modules. This study aims to examine the effect of using an Android-based E-module on student learning outcomes in class X virus material SMA Negeri 2 Barru. The examination technique utilized was semi-trial utilizing a non-identical benchmark group plan. The example in this review added up to 60 understudies and was separated into two gatherings, in particular the exploratory class and the control class, utilizing a purposive testing procedure. The instrument utilized is a trial of learning results and documentation. The information examination strategy utilized is expressive measurable investigation and inferential factual examination. Inferential measurable examination acquired sig. of 0.000, demonstrating that sig. $\alpha = 0.000 < 0.05$, so H_0 is dismissed and H_1 is acknowledged. These outcomes demonstrate that there is a critical impact from the utilization of Android-put together E-modules concerning understudy learning results in class X class X SMA Negeri 2 Barru material. The ramifications of this exploration are that the Android-based E-module can be applied by understudies to make more obvious the topic.

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INTRODUCTION

Efforts made by someone to guide others to become a quality person, both in terms of mentality, behavior, morals, and religious aspects so that they are by the values and norms that apply in society is called education (Arifuddin, 2018). Education has an important role in creating the nation's children who are intelligent and able to face the various demands of change that occur in this modern era. Education acts as a vessel or means for students to build character to improve

self-quality for the sake of creating a prosperous and prosperous nation and state (Faisal et al, 2019).

Primarily education aims to realize students who have potential in various aspects to achieve a higher quality personality and achieve the goals of human life which are naturally caliphs. Education is likened to an activity that is carried out both consciously and unconsciously in maturing oneself through training, teaching, and guidance activities (Nurbaya et al, 2020). Education can be applied in several ways, some occur naturally or from parents who are known informally (Anwar, 2014).

One measure of the success of an education can be seen from the results of student achievement in the learning process. Learning outcomes have an important role in the learning process. This is because learning outcomes can be used as a benchmark to find out how far students have changed after receiving their learning experience which can be measured in the form of knowledge, attitudes, and skills. Educators have great hopes that the learning process can provide progress for students in achieving learning goals. However, in reality, the results achieved by students vary from one to another. there are still many students who have low learning outcomes. This is influenced by the learning strategy implemented by the teacher (Fuad et al, 2019). In addition, several factors also influence the success of learning including teacher teaching methods and the use of teaching media that are not appropriate (Kurniawan et al, 2017).

Problems with learning outcomes often arise because the use of inappropriate teaching media causes students to easily get bored and fed up when studying. Moreover, nowadays we still find the teaching and learning process monotonous. For example, in biology, especially in virus material. Moreover, viral material is one of the materials for which there are many scientific terms. Students often complain and feel that biology lessons are boring (Harahap and Salam, 2017).

In line with research conducted by Fatimah Dian Sari H and M. Yusuf Nasution at SMA Negeri I Rantau Selatan, North Sumatra, it was stated that one of the problems encountered during learning was low student learning outcomes caused by students often assuming that virus material was difficult material because it uses a lot of Latin language and terms. This results in students having difficulty remembering Latin names, memorizing concepts, and imagining (Sari H. and Nasution, 2018).

Indonesia has now entered the Internet of Things (IoT). The development of digital systems, connectivity, and virtual intelligence which also has an impact on the education system is a sign of the entry of IoT into Indonesia. Currently, students aged 13-24 years who are referred to as Generation Z (Gen Z) are very dependent on technology. Gen Z's learning preferences begin to change and they like all kinds of challenges. Gen Z is very fond of using digital tools in the learning process because it makes it easier to access various things related to learning wherever and whenever. By utilizing digital tools such as smartphones, tabs, or laptops to access the internet, students can carry out discussions in an online forum (Lase, 2019).

In the era of modernization, the development of science and technology has also increased very rapidly. One of the results of the modification of learning media by utilizing technological advances is the E-module (Electronic Module). E-modules are the latest modifications or innovations of modules designed to increase students' understanding of learning. E-modules have their advantages by attracting the interest of their users compared to modules because E-modules include images or animations, audio-visual, and tests in the form of questions that are arranged more creatively. Users can access the E-module through various digital devices such as computers, laptops, and cell phones (Cheva and Zainul, 2019).

Different from previous research which used project-based e-modules in the form of PDF files as learning media (Dewi and Lestari, 2020). This research uses an Android-based e-module in the form of an application. The material in the Android-based e-module is integrated with Islam

and is equipped with a formative test at the end of the learning topic. The competency test section consists of 15 multiple-choice questions and students can see the value or score obtained as well as the answer key to measure the level of students' mastery of the material.

In line with the development of modules into E-modules, increasingly advanced technology also makes it easier for people to use the internet by accessing it via Android. Android is an operating system found on smartphones and tablets in which various features are useful to help and facilitate human life. This software contains an operating system, application, and middleware (Purwantoro et al, 2013).

The scientist directed non-formal meetings with Science class X educators at SMA Negeri 2 Barru. Given the consequences of the meetings, it was seen that "the growing experience at the school had never involved showing materials as Android-based E-modules. Instructing materials that are typically utilized in the educational experience are just as course books/prints or power focuses. This causes boredom and boredom for students, which results in reduced attention when studying. Repeated use of PowerPoint designs/templates makes students feel bored and bored (Kamil, 2018). Android-based e-modules are the chosen alternative, considering that currently most students already have smartphones (Sidiq and Najuah, 2020). The purpose of this study is to determine the influence of the Android-based e-module in improving student learning outcomes on virus material in high school.

RESEARCH METHODS

Research Design

The exploration configuration utilized was a non-comparable benchmark group plan. This plan is practically equivalent to the Pretest-posttest Control Gathering Plan, yet the subjects are not taken haphazardly, both for the trial bunch and for the control class (Ibrahim et al. 2018). This research was conducted at SMA Negeri 2 Barru, Soppeng Riaja District, Barru District, South Sulawesi Province in February-March 2023.

Population and Samples

The populace in the review were all understudies of class X IPA SMA Negeri 2 Barru, adding up to 153 understudies. while the example in this review comprised of 2 classes. to be specific class X IPA 1 is the control class (without treatment) and class X IPA 2 is the exploratory class (with treatment). The two classes amounted to 30 students were taken by purposive analyzing strategy. Where the selection is not random or the determination of the sample by selection or special considerations. The considerations referred to here are the number of students and class schedules.

Instruments

The instruments used were test questions in the form of 25 multiple choice questions related to virus material with 5 answer choices (A. B. C. D and E) and documentation in the form of photos with students during learning activities. The indicators measured in this research consist of material aspects, construction and language aspects which were validated by two experts. The learning outcome test instrument developed is classified as valid (Table I). There are examples of questions used in this research:

- Viruses based on their nucleic acid components are divided into two. namely DNA and RNA viruses. which are included in RNA viruses are
 - A. polio, papilloma, and HIV viruses
 - B. polioviruses, smallpox, HIV and rabies
 - C. rabies, polio, HIV, and influenza viruses

- D. smallpox, hepatitis, papilloma, and HIV viruses
 E. hepatitis B virus, papilloma, smallpox, and polio

Table I. Validity test result

Question Items	Pearson Correlation	Sig. (2-tailed)	Information
1	0.282	0.02	Valid
2	0.349	0.00	Valid
3	0.341	0.00	Valid
4	0.330	0.01	Valid
5	0.356	0.00	Valid
6	0.298	0.02	Valid
7	0.257	0.04	Valid
8	0.307	0.01	Valid
9	0.384	0.00	Valid
10	0.289	0.02	Valid
11	0.320	0.01	Valid
12	0.321	0.01	Valid
13	0.285	0.02	Valid
14	0.307	0.01	Valid
15	0.356	0.00	Valid
16	0.403	0.00	Valid
17	0.489	0.00	Valid
18	0.320	0.01	Valid
19	0.371	0.00	Valid
20	0.648	0.00	Valid
21	0.459	0.00	Valid
22	0.374	0.00	Valid
23	0.567	0.00	Valid
24	0.579	0.00	Valid
25	0.340	0.00	Valid

Procedures

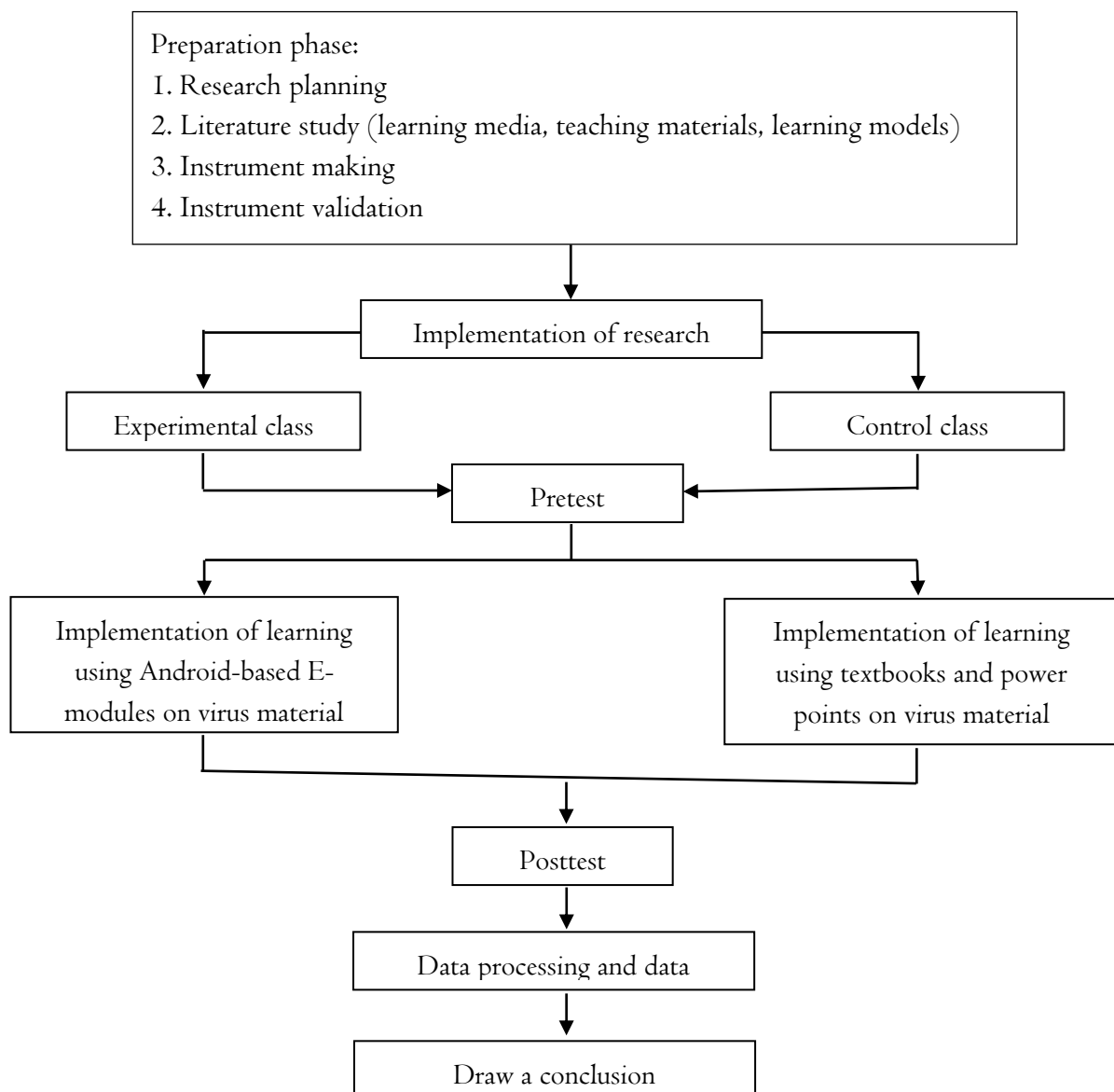
This research was conducted in 2 classes, namely the experimental class and the control class for 3 meetings. Each class was given a pretest first. the experimental class was taught using an Android-based e-module, while the control class was taught using a textbook and PowerPoint. Then, give a posttest in the form of 25 multiple-choice questions related to virus material to each class. The research flow chart is shown in Figure 1.

Data Analysis

This study utilizes enlightening factual information examination methods and inferential insights. Before doing the inferential measurable examination, it is important to do essential tests, in particular the ordinariness test and homogeneity test. Then, a speculation test was completed with the t-test (free t-test). Testing and information examination utilizing Factual Item and Administration Arrangement programming (SPSS rendition 27). Data were analyzed with a significance worth of 0.05 and a 95% conviction level. The classes of student learning results ought to be noticeable in the following table (Saleh and Filawati, 2019):

Table 2. Categories of learning outcomes

Value Range	Learning Outcomes Category
0-32	Very low
33-49	Low
50-66	Currently
67-83	High
84-100	Very high

**Figure I.** Research flow chart

RESULTS

The results of the research were conducted using the learning achievement test, the level of student learning outcomes was obtained 2 times, namely the pretest and posttest are shown in Table 3.

Table 3. Pretest and posttest data analysis

Data	Pretest Value		Posttest Value	
	Control Class	Experiment Class	Control Class	Experiment Class
Average	28.93	30.67	65.33	85.73
Min value	16	16	48	76
Maximum value	40	48	80	96
Standard deviation	5.626	7.526	8.934	5.819
Variance	31.65	56.644	79.816	33.857

By taking a gander at the post-test information obtained in the trial class and control class by directing the essential test., specifically the ordinarieness test and homogeneity test. inferential measurable examination was completed to decide if the utilization of Android-based E-modules affected understudy learning results in the test class (X IPA 2) and control class (X IPA 1). separately. Then. do the hypothesis test (t-test) as follows:

The ordinarieness test in this review was done utilizing the Kolmogorov-Smirnov test with the assistance of Measurable Item and Administration Arrangement programming (SPSS adaptation 27). The ordinarieness test results should be visible in Table 3. which demonstrates that the information has been regularly dispersed with huge qualities for the trial class got sig. = 0.147. While the control class was acquired by sig.= 0.120 and 0.145. While the worth of $\alpha = 0.05$. this shows that sig. > α and that implies that the information in this study is regularly appropriated.

Table 4. Normality test result

Class	Kolmogorov Smirnov			Information
	Statistics	df	Sig.	
Pretest Experiment	0.138	30	0.147	Normal distribution
Posttest Experiment	0.139	30	0.147	
Pretest Control	0.143	30	0.120	
Posttest Control	0.139	30	0.145	

A homogeneity test is a test to determine whether the sample taken comes from a homogeneous population or comes from a heterogeneous population. In this test, the Levene Statistical test was used. The test models with an importance level of 0.05 on the off chance that the sign worth > α . the populace information has a homogeneous fluctuation and if the sign worth < α . the populace information has a heterogeneous difference. The homogeneity test results should be visible in Table 5.

Table 5. Homogeneity test result

Levene Statistics	df1	df2	Sig.	Information
1.060	6	20	0.418	Homogeneous

Hypothesis testing was carried out to get an overview regarding the condition of the population which became the benchmark for testing the validity of the research sample statistical data that had been obtained. In testing the speculation, an autonomous example t-test is utilized which plans to look at the midpoints of two different example subjects utilizing the Surveyed difference t-test recipe. The speculation of this review was tried with the accompanying standards: 1) On the off chance that the sign is worth <0.05 , H_1 is acknowledged. 2) If the sign is worth > 0.05 , H_0 is acknowledged. The hypothesis test results can be seen in Table 6.

Table 6. Hypothesis test result

	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	6.684	0.012	10.480	58	0.000
Equal variances not assumed			10.480	49.851	0.000

DISCUSSION

The purpose of this study is to ascertain how Android-based E-modules affect student learning outcomes. The level of learning results showed utilizing the Android-based E-module is classified given the scope of learning accomplishment test scores, there are 22 understudies in the extremely high classification (84-100) with a level of 73% and there are 8 understudies in the high classification (67-83) with a level of 27%. From this information, it is realized that the learning results of understudies who are shown utilizing the prevailing Android-based E-module are in the extremely high class. In the meantime, the level of learning results instructed without utilizing an Android-based E-module is classified given the scope of learning accomplishment test scores, there are 14 understudies in the high classification (67-83) with a level of 43%, there are 15 understudies in the medium classification (50-66) with a level of half, and there is 1 understudy in the low classification (33-49) with a level of 3%.

Students' active participation is the reason that Android-based E-module-taught classes achieve high learning outcomes. The student's interest and drive to learn in the classroom lead to this active participation. The determination to show media done by instructors can rouse understudies (Nabillah, 2019). The utilization of media in the educational experience can draw in understudies' interest with the goal that the learning results be additionally increment. As a result, Android-based E-modules are utilized as media during this learning process. Android-based e-modules are applications that are presented as non-printed modules that can be accessed using Android.

The Android-based E-module contains the primary material and questions used to train students' abilities, resulting in better learning outcomes for students who use it. Suarsana and Mahayukti (2013) express that Android-based E-modules can be utilized to prepare materials and oblige different understudy learning speeds. Understudies who have a high learning rate will comprehend the items in the module all the more rapidly, though understudies who are slow are given the comfort to continue learning material as wanted because the E-module can be gotten to whenever so understudies can all the more effectively grasp learning material.

Fadhillah and Andromeda (2020) state that apart from writing, we can see a more interesting display of text or images because they are equipped with videos or animations that can be observed using a cellphone or computer. Do not rule out the possibility for students to learn independently because of the ease of accessing the media.

A tremendous contrast between the learning results of the trial and control classes is because of getting the hang of utilizing Android-based E-modules, material about infections is organized



methodically and furnished with ideas and questions connected with the material to be considered. This showing material is viewed as more beguiling by understudies since it has given different significant level highlights, for example, general media, plans, and questions that are outfitted with answer keys. In the control class which was educated without utilizing an Android-based E-module, the media utilized were showing media as course readings and PowerPoint. The contents presented by the textbook are too dense so students feel confused and complicated in capturing information. There are several drawbacks that textbooks have, including the material presented being too dense, sentences that are difficult to understand, and the images presented are not colored so students feel confused and difficult to understand the material (Adrian and Jafar, 2015). In addition, the use of power points in the teaching and learning process can make the teacher only "show and tell" without explaining the content of learning (Ardianti et al, 2013).

As indicated Dewi Masruroh and Yuli Agustina (2021) expressed that the utilization of Android-based E-modules is successfully used to further develop understudy learning results. As a general rule, it tends to be presumed that the Android-based E-module fundamentally affects the further development of understudy learning results as demonstrated by the distinction in the normal grades of the control class and the trial class. The use of Android-based E-modules, which give students more time to comprehend the material, is the cause of this influence. This review demonstrates that there is a positive impact on the utilization of Android-put-together E-modules concerning understudy learning results in class X infection material at SMA Negeri 2 Barru.

CONCLUSION

The learning results of understudies in the exploratory class (X IPA 2) on the subject of infections have expanded. The typical worth is 30.67 to 85.73 which is in the extremely high classification. In the meantime, the learning results of understudies in the control class (X IPA 1) in the infection subject encountered an increment. The general student score doesn't meet the KKM (Least Climax Principles) that is normal for schools. which is 75. yet the typical worth of 28.93 risings to 65.33. which falls into the moderate class. This truly implies that there is a huge impact from the utilization of Android-put together E-modules concerning understudy learning results on infection material. The obtained results of the hypothesis testing. namely $t_{count} > t_{table}$ ($10.480 > 1.671$). provide evidence of this. As a result. H_a is accepted at a significant level of 5% ($= 0.05$) while H_0 is rejected. This research implies that Android-based E-modules can be applied by students to make it easier to understand and remember the material and can help students get maximum results.

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